PLANETARY DEFENSE

a duty for world defenders

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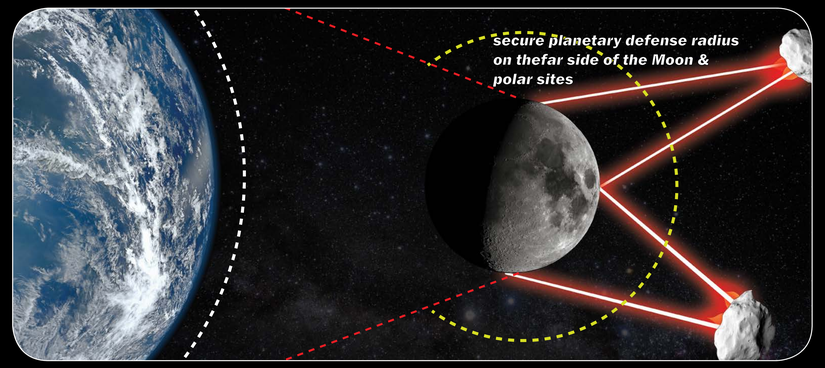


ABSTRACT

This poster is an advocacy document. We believe that it is now time for an international coalition of military/industrial/atomic agencies to take on the tasks of designing, building and maintaining in readiness active defenses against asteroids and comets threatening to impact Earth.

We visualize a policy environment where a relatively small portion of existing defense resources is redirected to Planetary Defense, with already-established ground and space PD efforts allocated increased backing and increased responsibility in supporting roles.

A main part of the needed policy structure is already in place. An International Asteroid Warning Network (IAWN) and a Space Mission Planning Advisory Group (SMPAG) [1] are functioning under auspices of the UN Committee on Peaceful Uses of Outer Space (COPUOS). In the near term, intercept action will be launched upon validation of an impact threat by IAWN and SMPAG. The activity should start with conventional technology while awaiting needed international policy changes allowing use of nuclear energy, essential in the case of less-likely but more dangerous threats. An important side benefit of the proposed collaborative military involvement would be increased knowledge of the risk and increased trust among nations.

PRESENT STATUS AND NEEDED NEXT STEPS

In April 2015 [2] the fourth annual IAA Conference on Planetary Defense occurred at ESRIN, Frascati, Italy. In addition to a global review of progress it included a scenario exercise where participants acted out a partly-successful deflection and recovery event. At IAC 2015 in Jerusalem [3,4,5] three papers dealt with aspects of PD. The NEOWise spacecraft is making infrared detections from orbit, complementing professional and amateur ground observations. Detection and evaluation records are archived at the Minor Planet Center in Cambridge, USA and ESA's NEO Coordination Center at ESRIN. IAWN and SMPAG [6] are functioning.

Detection rates, including smaller objects and objects coming from Earth's dayside, should be increased. Immediate needs include augmented ground-based observations both optical and radar, especially from the southern hemisphere. Additional space infrared observatories such as NEOcam [7] and Sentinel [8] should be launched.

Beyond these measures, work should begin towards building and maintaining intercept and deflection systems. The 2005 Deep Impact mission to Comet Tempel-1 showed that all the needed technology is in place. Now, it would be good to mount an early demonstration of deflection, not necessarily to a threatening object. An IAC paper [4] suggested that surplus ICBMs might be used to launch such tests.

Today, nations reluctant to share military information are unlikely to engage in full collaboration. At first, intercept efforts may be pursued independently, but policy discussions of a more coordinated approach should begin. A model for partial international collaboration in military action is the existing arrangement for building and dispatching UN peacekeeping teams. Also on the policy front, inclusion of space nuclear systems should be raised as a future prospect.

FINDINGS AND RECOMMENDATIONS

NEAR TERM

- **Augment ground-based detection and follow-up**
- **Expand infrared detection; e.g., NEOcam**
- **Deliver worldwide bolide data promptly to IAWN along with bomb destruction policy, allow nuclear NEO deflection**
- **Design, discuss, and demonstrate future non-nuclear systems**

FAR TERM

- **Activate international military-to-military collaboration**
- **Consider new body at UN using UN Peacekeepers deployment as analogy to avoid dangerous unilateral action**
- **Evaluate advanced prospects; e.g., international science and technology base on the far side of the Moon equipped with high power laser complex defending Earth**
- **Build and maintain ready nuclear interceptors as a last resort**
- **Educate and outreach to build public support, and also integrate with civil defense in case deflection is impossible or fails**

POLICY ARCHITECTURE

PRE-CONDITIONS

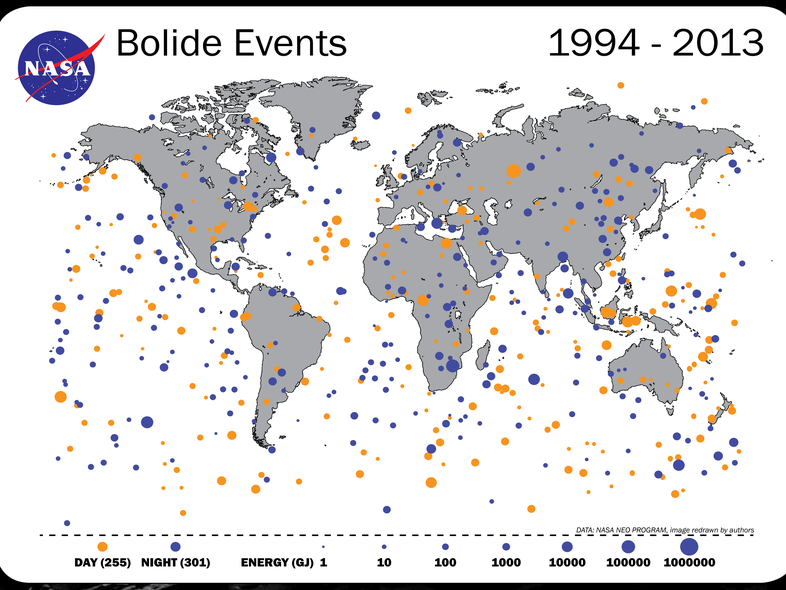
- New norm representing emerging humankind responsibility should be discussed at UN General Assembly
- We call the norm R2DE – Responsibility to Defend Earth
- The logic should be based on our experience with R2P – Responsibility to Protect
- With less debatable factors such as missing problem of sovereignty violation
- Unilateral action is likely in near term
- In the farther future we should seek more military involvement and collaborative action
- Public support should be engaged by EPO
- Russia, China and EU are willing to build base on Moon

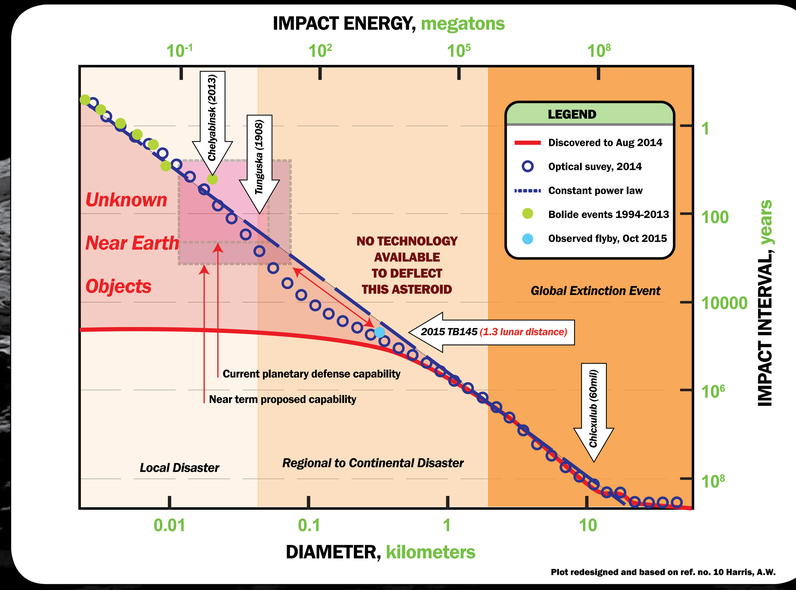
WE CALL FOR GLOBAL RESPONSIBILITY OF ALL OVER EARTH

POLICY ARCHITECTURE

- The military-Industrial complex is much more powerful than civilian administrations
- Military objective can also fund civilian projects technologically needed to establish working in-space dual-use infrastructures – Moon Base
- To engage all in a peaceful planetary defense endeavor, we propose to deploy Earth defense structures on the far side of the Moon so that they cannot threaten Earth
- This complex could be organized with similar logic to UN DPKO – Department of Peacekeeping Operations
- International collaboration – not limited to any nation – should be focused on deflection technology development, deployment and probation
- The whole inclusive process will help to create confidence among nations

WE PROPOSE A LONG-TERM IDEALISTIC VISON ON THE BASIS OF THE REALISTIC NEAR-TERM INTERNATIONAL ENVIRONMENT





THREAT MITIGATION INTERCEPT AND DEFLECTION OPTIONS

ORION-LIKE SOLUTION *(explosives producing crater with nuclear bombs producing thrust)*

DIRECTED ENERGY *(base on the far side of the Moon)*

- Swiss army knife swarm spacecraft *(Gravity tractor + Painting V + Solar concentrator)*
- Multi-landers solution *(type Rosetta-Philae) + Explosive*
- Combination (Robotic Arm + Net)
- Asteroid mining (send spacecraft)
- Asteroid mining (send humans)
- Lander Chemical Thruster
- Ion Beam deflection
- Nuclear deflection
- Solar concentrator
- Gravity Tractor
- Electrical Sail
- Robotic Arm
- Sun Shade
- Solar Sail
- Painting
- Kinetic
- Net

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